Hybrid Orbital Propulsion System (HOPS), Phase I

Completed Technology Project (2018 - 2019)

Project Introduction

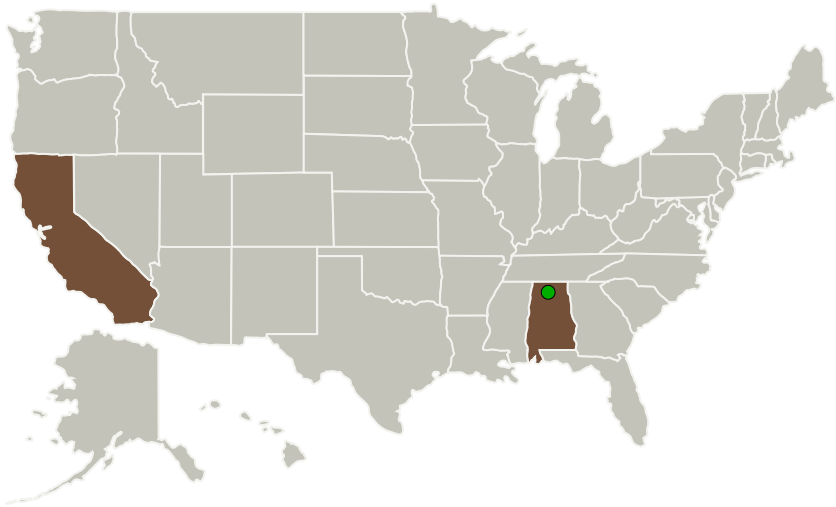
Exquadrum proposes to develop and demonstrate a highly-controllable, microsatellite scale Hybrid Orbital Propulsion System (HOPS) utilizing nitrous oxide oxidizer and an Exquadrum proprietary solid fuel formulation. The proposed system is high-thrust, readily scales between CubeSat sizes from 3U to 27U, and is capable of achieving impulse densities up to 1,300 Ns/U. The hybrid thruster powering the system is electrically ignited and capable of numerous restarts, with the number of thrust pulses limited only by the propellant supply. During the proposed Phase I project, Exquadrum will create a preliminary design of the propulsion system and conduct a hot-fire demonstration of a heavyweight thruster prototype.

Anticipated Benefits

Propulsion for deployment of CubeSat constellations, CubeSat operational orbit insertion, maintenance, collision avoidance, de-orbit, propulsion for Explorer class missions

Department of Defense nanosatellite constellation deployment, commercial Earth imaging and remote sensing constellation deployment and orbit maintenance

Primary U.S. Work Locations and Key Partners



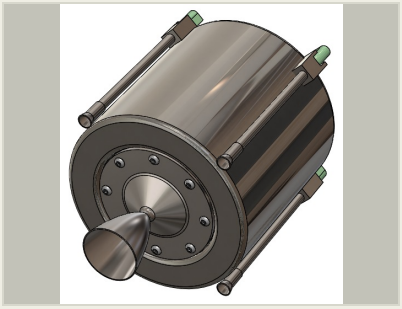


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Exquadrum, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Adelanto, California
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Transitions

July 2018: Project Start

February 2019: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/141741)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Exquadrum, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

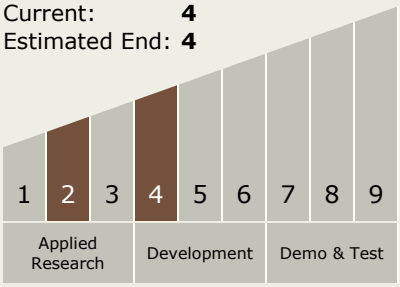
Carlos Torrez

Principal Investigator:

Marlow Moser

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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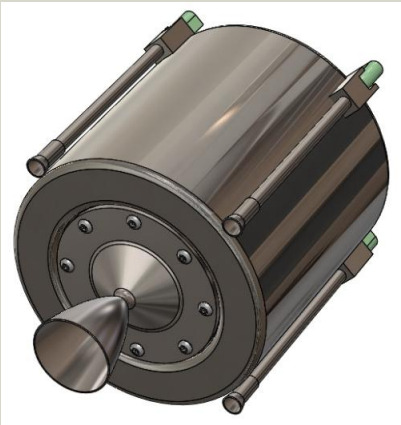
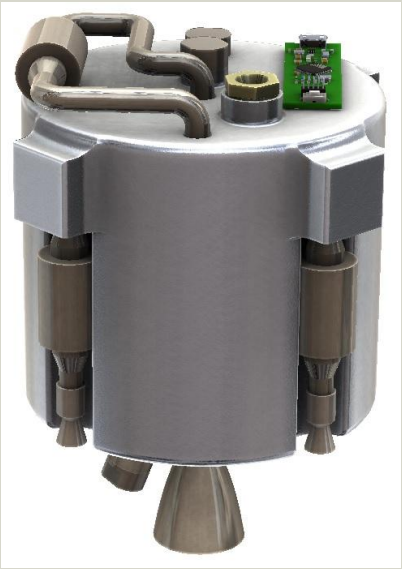
Images



Briefing Chart Image
Hybrid Orbital Propulsion System (HOPS), Phase I
(https://techport.nasa.gov/image/130073)



Final Summary Chart Image
Hybrid Orbital Propulsion System (HOPS), Phase I
(https://techport.nasa.gov/image/134278)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.5 Hybrids

Target Destination

Earth